

SUREKEY EXAMINATIONS BOARD



"Don't speak for Quality, Let Quality Speak for itself"

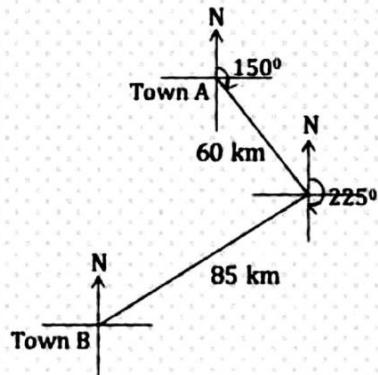
2024



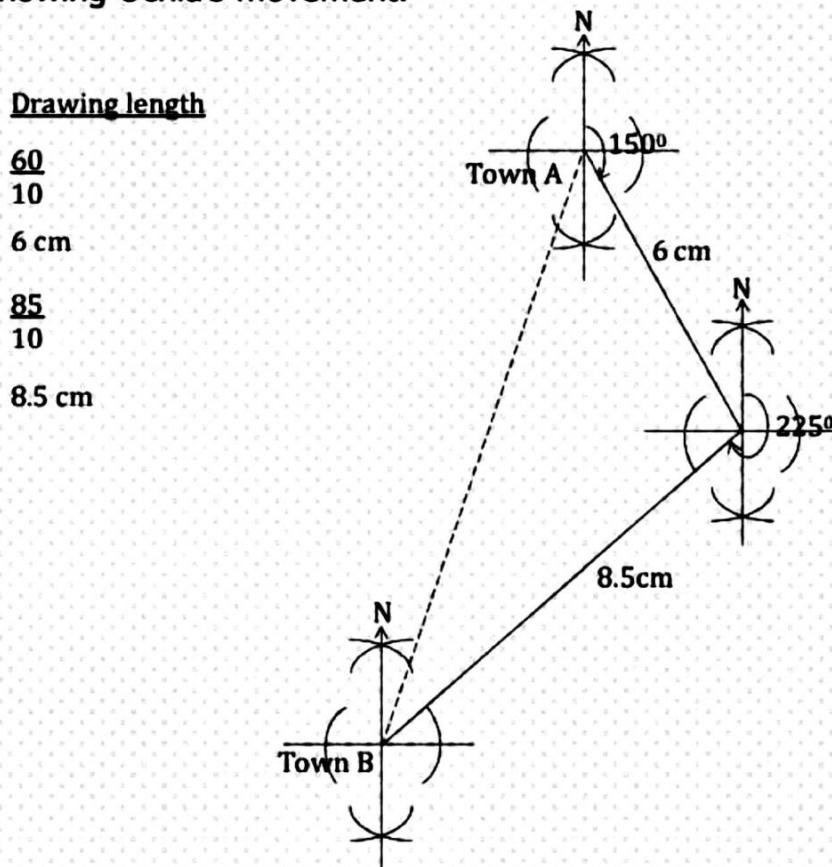
MATHEMATICS SUPER SERIES
OFFICIAL MARKING GUIDE

32. Ochia walked 60km from town A at a bearing of 150° . Before reaching his destination, he changed his direction and walked 85km at a bearing of 225° to town B.

- (a) Draw a sketch diagram of Ochia's movement. (01 Mark)



- (b) Using a scale of 1cm to represent 10km, draw an accurate diagram showing Ochia's movement. (04 Marks)



- (c) If he returned directly from town B back to town A, find the shortest distance between the two towns. (01 Mark)

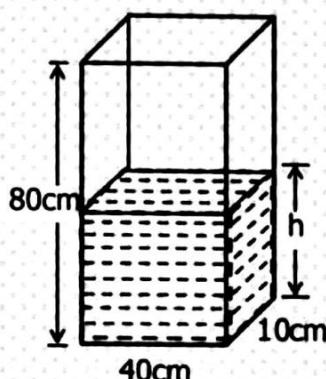
$$B \text{ to } A = 11.7 \text{ cm}$$

$$\frac{117}{10} \times 10$$

117 km

END

31. The tank below is $\frac{1}{4}$ empty of water. Study it carefully and answer the questions that follow.



- (a) Find the value of h . (02 Marks)

<u>Empty height</u>	<u>Value of h</u>	<u>Fraction of water in the tank</u>	<u>Value of h</u>
$1 \times 80 \text{ cm}$	$80\text{cm} - 20\text{cm}$	$\frac{4}{4} - 1$	$3 \times 80 \text{ cm}$
4	60cm	$\frac{4}{4}$	4
$1 \times 80\text{cm}$		$\frac{3}{4}$	$3 \times 20 \text{ cm}$
4		$\frac{3}{4}$	60cm
20cm			

- (b) How much water in litres, is required to make the tank completely full? (03 Marks)

Number of litres needed

$$\begin{aligned}
 &= \text{Volume} \\
 &= 1000\text{cm}^3 \\
 &= L \times W \times H \\
 &= 1000 \text{ cm}^3 \\
 &= 40 \text{ cm} \times 10 \text{ cm} \times 20 \text{ cm} \\
 &\quad 1000\text{cm}^3 \\
 &= 8000\text{cm}^3 \\
 &\quad 1000\text{cm}^3 \\
 &= 8 \text{ litres}
 \end{aligned}$$

29. At China Town, 8 pens cost two fifth the cost of a book and a set costs Sh.5,000 less than the cost of a book. If the total cost of all the 3 items is Sh.19,000. How much will Tom pay for a dozen of pens? (05 Marks)

Let the cost of a book be y

book	8pens	set
y	$\frac{2}{5}y$	Y - sh.5000

$$\begin{aligned}
 y + 2y + y - sh.5000 &= sh.19000 \\
 5y &= sh.19000 \\
 5y + 2y \times 5 + y \times 5 - sh.5000 \times 5 &= sh.19000 \times 5 \\
 5y + 2y + 5y - sh.25000 &= sh.95000 \\
 10y - sh.25000 &= sh.95000 \\
 12y - sh.25000 + sh.25000 &= sh.95000 + sh.25000 \\
 12y &= sh.120000 \\
 12 &= 12 \\
 y &= sh.10000
 \end{aligned}$$

Cost of 8 pens

$$\begin{aligned}
 2 \times sh.10000 \\
 5 \\
 2 \times sh.2000 \\
 sh.4000
 \end{aligned}$$

Cost of a dozen pens

$$\begin{aligned}
 sh.4000 \times 12 \\
 8 \\
 sh.500 \times 12 \\
 sh.6000
 \end{aligned}$$

30. A driver left Mukono moving at a speed of 60km/h for $2\frac{1}{2}$ hours to Jinja. He took breakfast for 30 minutes and then returned to Mukono directly through the same route at a steady speed of 50km/h.

- (a) How far is Jinja from Mukono? (02 Marks)

$$\begin{aligned}
 \text{Distance} &= \text{Speed} \times \text{Time} \\
 &= 60\text{km/hr} \times 2\frac{1}{2}\text{hr} \\
 &= 60\text{km} \times 5\text{hr} \\
 &\quad \cancel{\text{hr}} \quad 2 \\
 &= 30\text{km} \times 5 \\
 &= 150\text{km}
 \end{aligned}$$

- (b) Calculate the driver's average speed for the whole journey. (03 Marks)

Time taken on return journey

$$\begin{aligned}
 \text{Time} &= \text{Distance} + \text{speed} \\
 &= 150\text{km} + 50\text{km} \\
 &\quad \cancel{\text{hr}} \\
 &= 150\text{km} \times \frac{1}{50\text{km}} \\
 &= 3\text{ hr}
 \end{aligned}$$

Total distance

$$\begin{aligned}
 &= 150\text{km} \times 2 \\
 &= 300\text{km}
 \end{aligned}$$

Total time taken

$$2\frac{1}{2}\text{hr} + \frac{1}{2}\text{hr} + 3\text{h}$$

6hr

Average speed for the whole journey

$$\begin{aligned}
 &= \frac{\text{Total Distance}}{\text{Total time}} \\
 &= \frac{300\text{km}}{6\text{hr}} \\
 &= 50\text{km/hr}
 \end{aligned}$$

- (b) Calculate the space left in the box after packing the Royco cubes in the box. (03 Marks)

<u>Height of box</u>	<u>Volume of box</u>	<u>Space left in the box after packing</u>
10 x 4	$V = L \times W \times H$	= 9600cm ³
40cm	= 16cm x 15cm x 40cm	= - 7680cm ³
<u>Length of box</u>	= 16cm x 600cm ²	<u>1920cm³</u>
4 x 4cm	= 9600cm ³	
16cm	<u>Volume of Royco cubes</u>	
	$V = 120 \times 64\text{cm}^3$	
	= 7680cm ³	

28. Nambasa borrowed a certain sum of money from ABSA bank at an interest rate of $12\frac{1}{2}\%$ per annum. At the end of 3 years, he had paid back a total of Sh.330,000.

- (a) How much did she borrow from the bank? (04 Marks)

$$\begin{aligned}
 P + I &= \text{Amount} \\
 P + PRT &= \text{sh.330000} \\
 P + P \times 12\frac{1}{2} \times 3 &= \text{sh.330000} \\
 P + P \times \left(\frac{100}{25 + 100} \right) \times 3 &= \text{sh.330000} \\
 P + P \times \frac{25 \times 1 \times 3}{2 \times 100} &= \text{sh.330000} \\
 P + \frac{75P}{200} &= \text{sh.330000} \\
 200 \times P + \frac{75P \times 200}{200} &= \text{sh.330000} \\
 200P + 75P &= \text{sh.66000000} \\
 275P &= \text{sh.66000000} \\
 275P &= \underline{\text{sh.66000000}} \\
 \underline{-275} & \quad \underline{275} \\
 P &= \text{sh.240000}
 \end{aligned}$$

She borrowed sh.240000 from the bank

- (b) How much interest did she pay in the 3 years? (01 Mark)

$$\begin{aligned}
 \text{Interest} &= \text{Amount} - \text{principal} \\
 &= \text{sh. 330000} \\
 &\quad - \underline{\text{sh. 240000}} \\
 &\quad \underline{\text{sh. 90000}}
 \end{aligned}$$

She paid sh.90000 interest in the 3 years.

25. Goretti went to the Supermarket and bought the items below which were written on her shopping list.

- 750g of rice each at Sh.5,200 per kilogram
- $1\frac{1}{2}$ litre of cooking oil at Sh.3,500 per litre.
- 2kg of flour at Sh.4,400.

- (a) How much did she pay for all the items on the list? (03 Marks)

<u>Rice</u>	<u>Oil</u>	<u>Total Expenditure</u>
$\frac{750}{1000} \times \text{sh.}5200$	$\frac{3}{2} \times \text{sh.}3500$	sh.4400
sh.75 x 52	3	sh.5250
sh.3900	sh.3 x 1750	+ sh.3900
	sh.5250	sh.13550

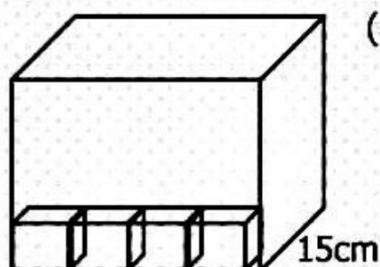
- (b) Find the cost of 3 litres of cooking oil at the same rate. (01 Mark)

$$\begin{array}{r} \text{sh.}3500 \\ \times \quad 3 \\ \hline \text{sh.}10500 \end{array}$$

26. Kakama bought 20 litres of milk at Sh.1,500 each. On his way home, some milk poured and he sold the remaining milk at Sh.1,200 per half litre and made a profit of 20%. How much milk was poured?

<u>Buying price</u>	<u>Let the milk poured be y</u>	(04 Marks)
sh. 1500 x 20	Milk sold will be $20 - y$	$-24y = -120$
sh.30000	Cost of 1 litre = sh. 1200 x 2	$-24 = -24$
<u>Selling price</u>	sh.2400	y = 5
100% + 20%	Since milk sold is $20 - y$, therefore,	5 litres of milk were poured.
120%	sh.2400($20 - y$) = sh.36000	
$120 \times \text{sh.}30000$	sh.48000 - sh.2400y = sh.36000	
100	480 - 24y = 360	
sh.36000	480 - 480 - 24y = 360 - 480	
	- 24y = - 120	

27. Joyce packed Royco cubes each of volume 64cm^3 in a cuboidal box. 10 layers were formed in the box and 4 cubes were packed along the length as shown below.



- (a) How many Royco cubes did Joyce pack in the box altogether?

<u>Side length of each cube</u>	<u>S = 4 cm</u>	<u>Number of cubes packed in the box</u>
$S \times S \times S = V$	<u>Cubes along the width</u>	
$S^3 = 64\text{cm}^3$	15cm	$10 \times 4 \times 3$
$\sqrt[3]{S^3} = \sqrt[3]{64\text{cm}^3}$	4cm	120 cubes
	3 cubes	
	<u>Cubes along the length</u>	
	4 cubes	
	<u>cubes along the height</u>	
	10 cubes	

(b) Change 0.636363.....into a common fraction in its lowest form.

(03 Marks)

Let the fraction be x

$$\begin{aligned}x &= 0.6363\dots \\x \times 100 &= 0.6363 \times 100 \\100x &= 63.63\dots \\-x &= 0.63\dots \\99x &= 63 \\99 &99 \\x &= \frac{63}{99} \\&= \frac{7}{11}\end{aligned}$$

Method 2

$$\begin{aligned}0.6363\dots \text{short form} &= \overline{0.63} \\ \text{Non recurring} &= 0 \\ \text{As a fraction} &= \frac{0}{1} \\ \text{Answer} &= \frac{63 - 0}{100 - 1} \\ &= \frac{63}{99} \\ &= \frac{7}{11}\end{aligned}$$

23. The table below shows the ages of children who were immunized against COVID 19 at Mubende Referral Hospital on a certain day.

Age	5	8	13	10
Number of children	3	4	1	r

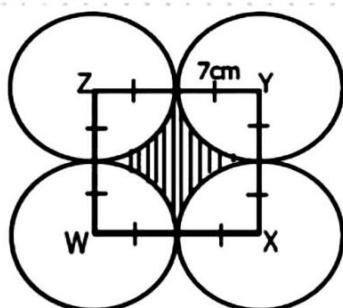
- (a) Find the value of r if their average age was 8. (03 Marks)

$$\begin{aligned}\text{S.O.D} &= \text{Ave} \times \text{N.O.D} \\(5 \times 3) + (8 \times 4) + (13 \times 1) + (10 \times r) &= 8(3 + 4 + 1 + r) \\15 + 32 + 13 + 10r &= 8(8 + r) \\60 + 10r &= 64 + 8r \\60 - 60 + 10r &= 64 - 60 + 8r \\10r &= 4 + 8r \\10r - 8r &= 4 + 8r - 8r \\2r &= 4\end{aligned}$$

- (b) What was the modal age of the immunized children? (01 Mark)

The modal age was 8

24. The diagram below shows four circles in contact, each of radius 7cm. A quarter of each circle is occupied by a square WXYZ. Study it carefully and answer the questions that follow.



- (a) Workout the area of the square. (02 Marks)

$$\begin{aligned}\text{Area} &= S \times S \\&= 14\text{cm} \times 14\text{cm} \\&= 196\text{cm}^2\end{aligned}$$

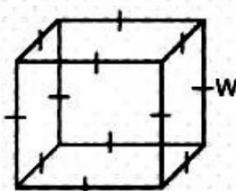
- (b) Find the area of the shaded region. (Use π as $\frac{22}{7}$)

$$\begin{aligned}\text{Area of Unshaded parts} &\\ \text{Area} &= 4 \times \frac{1}{4}\pi r^2 \\ &= 4 \times \frac{1}{4} \times \frac{22}{7} \times 7\text{cm} \times 7\text{cm} \\ &= \frac{22}{7} \times 7\text{cm}^2 \\ \text{Area} &= 154\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Shaded region} &\\ &= 196\text{cm}^2 - 154\text{cm}^2 \\ &= 42\text{cm}^2\end{aligned}$$

20. Below is a cube whose total surface area is 600m^2 .

Find the value of w .



$$\begin{aligned}
 6s^2 &= \text{T.S.A} \\
 6w^2 &= 600\text{m}^2 \\
 6w^2 &= 600\text{m}^2 \\
 6 &\quad 6 \\
 w^2 &= 100\text{m}^2 \\
 \sqrt{w^2} &= \sqrt{100\text{m}^2} \\
 w &= 10\text{m}
 \end{aligned}$$

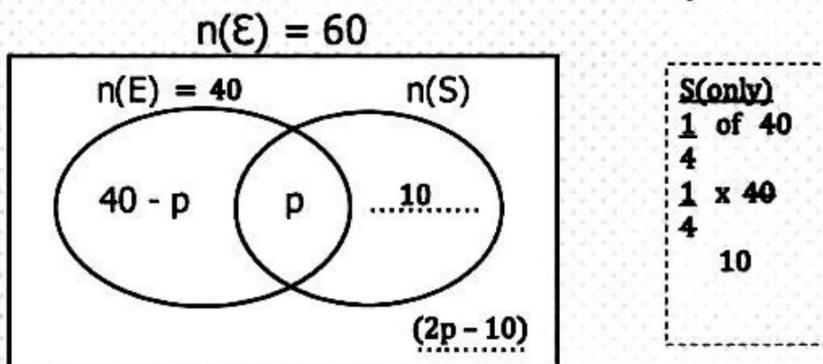
SECTION B: 60 MARKS

Answer all questions in this section

Marks for each question are indicated in brackets.

21. In a class of 60 pupils, 40 pupils like English (E), $\frac{1}{4}$ of the pupils who like English like Science (S) only. p pupils like both English and Science while $(2p - 10)$ pupils do not like any of the two subjects.

- (a) Complete the Venn diagram below using the above information.
(02 Marks)



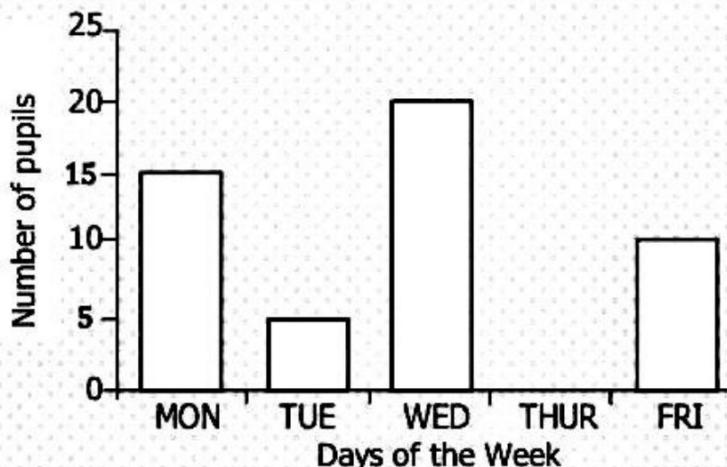
- (b) Find the number of pupils who like none of the subjects.

$$\begin{array}{l|l}
 40 + 10 + (2p - 10) = 60 & \text{Pupils who like none} \quad (03 \text{ Marks}) \\
 50 - 10 + 2p = 60 & 2p - 10 \\
 40 + 2p = 60 & 20 - 10 \\
 40 - 40 + 2p = 60 - 40 & 10 \text{ pupils} \\
 2p = 20 &
 \end{array}$$

22. (a) Simplify: $\frac{0.48 \times 0.45}{0.09 \times 0.8}$ (03 Marks)

$$\begin{array}{r|l}
 \frac{48}{100} \times \frac{45}{100} + \frac{9}{100} \times \frac{8}{10} & 3 // 3.0 \\
 \frac{48}{100} \times \frac{45}{100} \times \frac{100}{9} \times \frac{10}{8} & \\
 \underline{6 \times 5} & \\
 \underline{10} & \\
 \underline{30} & \\
 \underline{10} &
 \end{array}$$

16. The graph below shows the number of pupils who were absent in a class of 50 pupils during a period of one week in Top Care P/S.



Workout the average attendance for the week.

$$\begin{aligned}\text{Average} &= \frac{\text{S.O.D}}{\text{N.O.D}} \\ &= \frac{(50 - 15) + (50 - 5) + (50 - 20) + 50 + (50 - 10)}{5} \\ &= \frac{35 + 45 + 30 + 50 + 40}{5} \\ &= \frac{200}{5} \\ &= 40\end{aligned}$$

17. Solve: $2m - 3 = 2$ (finite 7)

$$\begin{aligned}2m - 3 + 3 &= 2 + 3 \text{ (finite 7)} \\ 2m &= 5 \text{ (finite 7)} \\ 2m &= 5 + 7 \text{ (finite 7)} \\ 2m &= 12 \text{ (finite 7)} \\ 2m &= 12 \text{ (finite 7)} \\ 2 &= 2 \\ m &= 6 \text{ (finite 7)}\end{aligned}$$

18. What number has been expanded to get $(6 \times 10^3) + (5 \times 10^{-2})$?

$$\begin{aligned}(6 \times 10 \times 10 \times 10) + (5 \times \frac{1}{100}) \\ 6000 + \frac{5}{100} \\ 6000 + 0.05 \\ 6000.05\end{aligned}$$

19. 5 men can dig a garden in 8 days. How many days do 4 men take to do the same piece of work?

$$\begin{aligned}5 \text{ men dig in 8 days} \\ 1 \text{ man digs in } 5 \times 8 \\ 1 \text{ man digs in 40 days} \\ 4 \text{ men dig in } 40 \div 4 \\ 4 \text{ men dig in 10 days.}\end{aligned}$$

11. Find the sum of the next two numbers in the sequence below.

$$-6, -8, -10, -12, \dots 14, \dots 16 \dots$$

$\begin{aligned} -6 - 2 &= -8 \\ -8 - 2 &= -10 \\ -10 - 2 &= -12 \\ -12 - 2 &= -14 \\ -14 - 2 &= -16 \end{aligned}$	$\begin{aligned} -14 + -16 & \\ -14 + (-16) & \\ -14 - 16 & \\ -30 & \end{aligned}$
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12. A son is a half the father's age. The product of their ages is 200 years.
How old is the father?

Let the son's age be y

Father will be $2y$

$$y \times 2y = 200$$

$$2y^2 = 200$$

$$2y^2 = 200$$

$$2 \quad 2$$

$$y^2 = 100$$

$$\cancel{2}y^2 = \cancel{2}\sqrt{100}$$

$$y = 10$$

$$\text{Son} = 10 \text{ years}$$

$$\begin{aligned} \text{Father} &= 2 \times y \\ &= 2 \times 10 \\ &= 20 \text{ years.} \end{aligned}$$

OR

Let the father's age be y.

Son's age will be $\frac{1}{2}y$

$$\frac{1}{2}y \times \frac{1}{2}y = 200$$

$$\frac{y^2}{4} = 200$$

$$y^2 = 800$$

$$\sqrt{y^2} = \sqrt{800}$$

$$y = 20$$

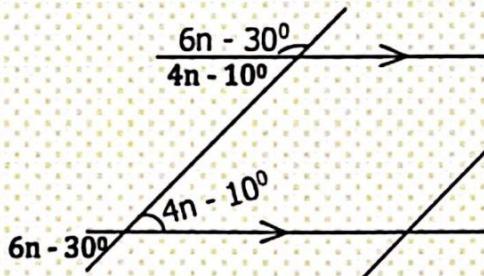
$$y^2 = 400$$

$$\sqrt{y^2} = \sqrt{400}$$

$$y = 20$$

The father is 20 years.

13. Find the value of n in the figure below.



$$\begin{aligned} 4n - 10^\circ + 6n - 30^\circ &= 180^\circ \\ 4n + 6n - 10^\circ - 30^\circ &= 180^\circ \\ 10n - 40^\circ &= 180^\circ \\ 10n - 40^\circ + 40^\circ &= 180^\circ + 40^\circ \\ 10n &= 220^\circ \\ \frac{10n}{10} &= \frac{220^\circ}{10} \\ n &= 22^\circ \end{aligned}$$

14. A, B and C shared Sh.98,000 in the ratio of 2:m:7 respectively.

If B got Sh.35,000. Find the value of m.

Total ratio of A and C

$$2 + 7$$

$$9 \text{ parts}$$

$$\text{sh.}98000$$

$$-\underline{\text{sh.}35000}$$

$$\underline{\text{sh.}63000}$$

9 part rep sh.63000

1 part rep sh.63000

$$\frac{m}{9}$$

1 part rep sh.7000

sh.7000 is rep by 1 part

sh.35000 is rep by sh.35000

$$\text{sh.}7000$$

sh.35000 is rep by 5 parts;

hence m = 5

OR

$$\frac{m}{2+m+7} \times \text{sh.}98000 = \text{sh.}35000$$

$$\frac{\text{sh.}98000 m}{9+m} = \text{sh.}35000$$

$$9+m$$

$$\frac{\text{sh.}98000 m}{9+m} \times 9+m = \text{sh.}35000(9+m)$$

$$9+m$$

$$\text{sh.}98000 m = \text{sh.}315000 + \text{sh.}35000 m$$

$$98m = 315 + 35m$$

$$98m - 35m = 315 + 35m - 35m$$

$$\frac{63m}{63} = \frac{315}{63}$$

$$m = 5$$

15. A thanksgiving prayer at Kibilibiri Primary School started at 10:45pm and ended at 1:10a.m. For how long did the prayer last?

Remaining hours to midnight

HR MIN

12 : 00

-10 : 45

1 : 15

Duration of prayer

HR MIN

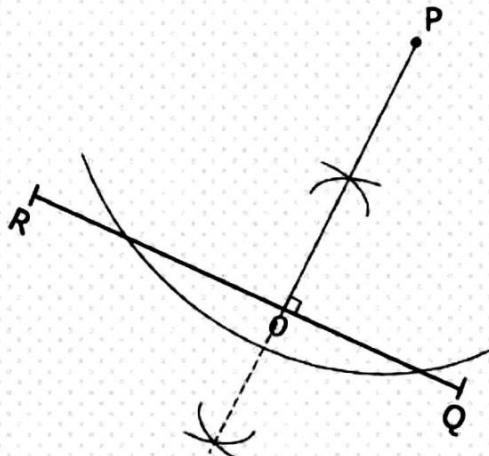
1 : 15

$\pm 1 : 10$

2 : 25

The prayer lasted for 2 hours and 25 minutes

6. Using a ruler, a pencil and a pair of compasses only, drop a perpendicular from point P to meet line segment RQ at point O.



7. A trader bought an article at Sh.30,000. He later sold it at a gain of $16\frac{2}{3}\%$.
Find the trader's gain.

$$\begin{aligned}
 & 16\frac{2}{3}\% \text{ of sh.}30000 \\
 & \left(\frac{50 + 100}{3} \right) \times \text{sh.}30000 \\
 & \left(\frac{50}{3} + 1 \right) \times \text{sh.}30000 \\
 & \left(\frac{50}{3} + \frac{100}{100} \right) \times \text{sh.}30000 \\
 & \frac{50}{3} \times \text{sh.}30000 \\
 & 300
 \end{aligned}
 \quad \mid \quad
 \begin{aligned}
 & 50 \times \text{sh.}100 \\
 & \underline{\text{sh.}5000}
 \end{aligned}$$

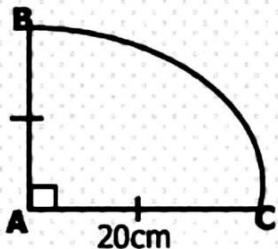
8. Subtract $3g - 8$ from $15 - 6g$.

$$\begin{aligned}
 & (15 - 6g) - (3g - 8) \\
 & 15 - 6g - 3g + 8 \\
 & 15 + 8 - 6g - 3g \\
 & 23 - 9g
 \end{aligned}$$

9. Find the binary base numeral represented by 13.

$$\begin{array}{r}
 \text{Binary is base two} \\
 13 \div 2 = 6 \text{ rem } 1 \\
 6 \div 2 = 3 \text{ rem } 0 \\
 3 \div 2 = 1 \text{ rem } 1 \\
 1 \div 2 = 0 \text{ rem } 1
 \end{array}
 \quad \mid \quad
 13 = 1101_{\text{two}}$$

10. The figure below is a quadrant ABC of radius 20cm.



Find the length of the arc BC. (Use π as 3.14)

$$\begin{aligned}
 C &= \frac{1}{4} \pi r \\
 &= \frac{1}{4} \times 2 \times 3.14 \times 20 \text{ cm} \\
 &= \frac{1}{4} \times 2 \times \frac{314}{100} \times 20 \text{ cm}
 \end{aligned}
 \quad \mid \quad
 \begin{aligned}
 &\underline{314} \\
 &10 \\
 &31.4 \text{ cm}
 \end{aligned}$$

SECTION A: 40 MARKS

**Answer all questions in this Section
Questions 1 to 20 carry two marks each**

1. Workout: $\frac{2}{3} \times \frac{1}{8}$.

$$\begin{array}{r} 2 \times 1 \\ 3 \quad 8 \\ 1 \times 1 \\ 3 \times 4 \end{array}$$

$$\begin{array}{r} 1 \\ 12 \end{array}$$

2. Write 512.604 in words.

Five hundred twelve and six hundred four thousandths OR

Five hundred twelve point six zero four.

3. Given that $W = \{2 \times 2 \times 3\}$ and $X = \{2^3 \times 3^2\}$. Find the Least Common Multiple (LCM) of W and X.

$$\begin{aligned} LCM &= \text{Product of the union} \\ &= \{2 \times 2 \times 2 \times 3 \times 3\} \\ &= 8 \times 9 \\ &= 72 \end{aligned}$$

4. Round off 47657 to the nearest hundreds.

TTH	TH	H	T	O
4	7	6	5	7
D.P.V (Add 100)				
R.P.V				

47600
 + 100
 47700
 47657 ≈ 47700

5. In a basket, there are 3 bad eggs and the rest are good. The probability that a bad egg is picked at random from the basket is 15%. How many good eggs are in the basket?

$$\begin{aligned} \text{Total number of eggs} &= 3 + 15 \\ &= 100 \\ &= 3 \times 100 \\ &= 15 \\ &= 20 \text{ eggs} \\ \text{Number of good eggs} &= 20 - 3 \\ &= 17 \text{ eggs} \end{aligned}$$

$$\begin{aligned} \text{OR} \\ \text{Percentage of good eggs} &= 100\% - 15\% \\ &= 85\% \\ \text{Number of good eggs} &= 15\% \text{ rep } 3 \text{ eggs} \\ &= 1\% \text{ rep } 3 \\ &= 15 \\ &= 85\% \text{ rep } 3 \times 85 \\ &= 15 \end{aligned}$$

85% rep 17 eggs